THE WEEDS OF GARDEN ISLAND – AN ANNOTATED LIST

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ABSTRACT

Currently 122 species of weed have been recorded fron Garden Island, the site of the first European settlement on the West Coast of Western Australia in 1829. The most serious weed of Garden Island is Arum lily. Another potentially serious weed is Bridal Creeper. There are 30 widespread weeds (*Homeria* and *Trachyandra* could be serious) on the island. Nine weeds restricted to beaches and another 6 confined to rocky headlands, including the serious weeds; *Lycium* and *Lavatera*. Eleven weeds recorded for the island appear to have become extinct and 6 weeds are just persisting. There are 4 very localised weeds, one *Agonis flexuosa* (Peppermint) needs to be removed urgently. There are 10 weeds localised to developed areas. New weed records are mainly from the developed areas and beaches and require monitoring.

INTRODUCTION

Recently there have been published a series of studies on the native vegetation, flora (McArthur, 1990 and Keighery *et al.*, 1997) and fauna (Brooker *et al.*, 1995 and Brooker *et al.*, 1995) of Garden Island.

These studies have demonstrated that Garden Island contains a number of very significant plant communities, especially those woodlands and forests dominated by *Callitris preissii* or *Melaleuca lanceolata*. Elsewhere, on the mainland and Rottnest Island occurrences of these communities have been largely cleared and the remaining remnants severely impacted by weeds, feral animals, fire, and other disturbances, thus they are in need of extensive rehabilitation. Garden Island is the key area for the continuance of these now rare communities and should be kept as free of weeds of these communities as possible.

Apart from one very serious invasive weed, the Arum Lily, about which a workshop was recently held (Scott and Wykes, 1997), little is known about the abundance, distribution and

effects of weeds on Garden Island. This paper documents major changes that have occured in the weed flora over the last 14 years. It also details the current state of knowledge of the other introduced and naturalised plants of Garden Island and uses comaparable mainland sites and data to estimate threats of these weeds.

METHODS

To compile a list of the weeds of Garden Island all known published and unpublished sources and opportunistic collections were consulted, with the records updated to current taxonomy. Quadrats established as part of the floristic survey of the Swan Coastal Plain (Gibson *et al.*, 1994) were used to assess weed spread. A separate ground survey of the weeds of Garden Island and Woodmans Point was undertaken in 1992. Weeds were rated on their actual potential impact on the natural communities of Garden Island by reference to Woodmans Point, Rottnest Island (Keighery, 1986) and the Perth area as detailed in Dixon and Keighery (1995).

GENERAL NOTES ON THE WEED FLORA OF GARDEN ISLAND

The weed flora of Garden Island is listed in Appendix 1. Currently a total of 122 taxa of introduced plants have been recorded from the Island.

This weed flora is not static and since the last published listing (Marchant and Abbott. 1982) there have been additions, deletions and other changes, for example, our surveys in 1992 revealed 22 new records of introduced plants for the Island.

A) CHANGES

Four factors affecting the weed flora of the Island have changed greatly since the last major suvey in 1979 (Marchant and Abbot, 1981).

1) Cessation of uncontrolled introductions occurring around the Settlement and northern shacks.

Most of the species grown in these areas listed in previous reports have either:

(a) Apparently died out–This includes the records for the following 6 planted garden species: *Auricaria heterophylla* (Norfolk Island Pine), *Punicea granatum* (Pomegranate), *Craetagus* sp. (Hawthorn), *Hedra helix* (Ivy), *Ixora* sp.and *Vitis vinifera* (Grape).

(b) Have persisted, or spread only marginally by vegetative means–This includes the records for the following 15 species: *Agave americana* (Century Plant), *Allium ampeloprasum* (Wild Leek), *Eucalyptus gomphocephala* (Tuart), *Euphorbia dendroidea* (Tree Spurge), *Ficus carica* (Fig), *Ipomaea indica* (Blue Morning Glory), *Iris germanica* (German Iris), *Leucojeum aestivum* (Snowflake), *Melia azederach* (Cape Lilac), *Narcissus tazetta* (Jonquil), *Nerium oleander* (Oleander), *Ornithogalium arabicum* (Arabs Eye), *Schinus terrebinthifolius* (Japanese Pepper)

and *Vinca major* (Vinca). One species, *Anredra cordifolia* (Potato Vine) is apparently still spreading via bulbils in the leaf axils.

2) Capping of the old bores where numerous weeds grew and flourished.

This has apparently resulted in the demise of 5 previously recorded species listed: *Cymbalaria muralis* (Ivy Leaved Toadflax), *Nasturtium officinale* (Water Cress), *Musa sapentium* (Plaintain Banana), ?*Arundo donax* (Bamboo) and *Typha orientalis* (Bullrush).

3) Increases in the number of weeds present on the beaches of Garden Island– During my brief studies on the island I have located 7 new weeds on the beaches and headlands of Garden Island: *Mesembryanthemum crystallinum* (Ice Plant), *Arctotheca calendula* x *populifolia*, *Conyza parva* (Fleabane), *Euphorbia paralias* (Sea Spurge), *Thinopyrum distichus* (Sea wheat) and *Lycium ferocissimum* (Box Thorn). This increase reflects both the increased usage of these areas, by recreational boaters and searching of rocky headlands by the author. Several of these weeds were recorded from the new beach being developed at Broun Bay at the base of the causeway.

Sea Spurge is currently spreading along the north-western beaches of Garden Island, and will become a major component of the strand flora. This population probably arrived on a boat or in gear which had seeds present on it. The size of the population suggests that this species has been resident for some time (Keighery and Dodd, 1997).

The single plant of Sea Wheat probably came from Woodmans Point, where the species is abundant on the fore dunes. If other plants arrive and establish it will also become a major component of the strand flora.

4) The presence of irrigated lawns and frequent vehicular traffic to the mainland is giving a new suite of weeds at the Stirling Base. A notable example of this is *Juncus acutus* (Spiny Rush) which has invaded irrigated ovals from a nearby drainage basin (GIEAC, 1996). Some of these weeds could build up populations here and then spread into adjacent bushland areas.

One potential weed in this catagory is *Hibbertia cueniformis* (Cutleaved Hibbertia) which Wykes (pers. comm., 1997) has noted that planted material is self-seeding around the base. Elliot and Jones (1990) have previously noted this occuring in this species and feel it has the potential to be an environmental weed in coastal areas of Australia, especially since it occurs naturally in coastal areas from south of Rockingham to Esperance. It also has seed spread by birds and it could potentially spread throughout the island.

Examples of plants in the base area which are known bushland weeds in the Perth Area are: *Brassica tournefortii* (Prickly Turnip), *Conyza albida* (Tall Fleabane), *Pseudognaphalium luteo-album* (Jersey Cudweed), *Senecio vulgaris* (Common Fireweed), *Minuartia mediterranea* (Sand Wort). The following species are unlikely to invade bushland on

Table 1. Unburnt Callitris/ Melaleuca/ Acacia sites.

Key

G1,3,4	Woodland quadrats on Garden Island, Swan Coastal Plain Survey (SCP).
GB	Burnt Melaleuca quadrat on Garden Island
WP	Unburnt quadrat at Woodmans Point,SCP Survey
TD	Unburnt Callitris quadrat at Trigg Dunes, SCP Survey

	G1	G3	G4	GB	WP	TD
Callitris preissii	*	*			*	*
Acacia rostellifera			*		*	*
Acanthocarpus preissii	*	*	*	*		*
Acrotriche cordata						*
Agrostis preissii		*				
*Aira cupiana	*		*	*		*
*Anagallis arvensis	*		*			
Apium anuum		*	*			
*Briza maxima						*
Calandrinia calyptrata					*	*
*Catapodium rigidum		*				*
*Cerastium glomeratum	*	*				
Clematis microphylla	*	*	*	*		*
Comesperma integerrimum		*		*		
Conostylis candicans					*	
Crassula colorata			*			
*Crassula glomerata	*			*		*
*Daucus glochidiatus						*
Eremophila glabra	*			*		
*Erhrata longiflora					*	
Eucalyptus gomphocephala					*	
*Euphorbia peplus					*	
*Galium murale	*	*	*	*	*	*
Hardenbergia comptoniana		*			*	
*Lagurus ovatus	*					*
Lasiopetalum oppositifolium			*			
Lepidium puberulum		*				
Leucopogon australis			*			*
Melaleuca acerosa					*	
Melaleuca lanceolata	*	*	*	*		
Myosotis australis		*				
*Myrsiphyllum asparagoides		*		*		
Oxalis perrenenans	*					
Parietaria debilis	*	*		*		
Phyllanthus calycinus	*	*		*		
Poa poiformis				*		
Poranthera microphylla	*	*				
Rhagodia baccata	*		*		*	*
Santalum acuminatum					*	
Spyridium globulosum	*		*	*	*	*
Senecio lautus						*

Table 1 (cont.)

	G1	G3	G4	GB	WP	TD
*Sonchus oleraceus	*				*	*
*Solanum nigrum	*					*
Solanum symonii	*			*		
Stipa flavescens	*	*				
Thomasia cognata				*		
Thysanotus patersonii	*					
*Trachyandra divaricata	*		*	*	*	
Trachymene caerulea	*	*		*		
Trachymene pilosa	*	*	*	*		
*Vulpia myorus		*				
*Zantdescia aethiopica	*		*			
Total	25	21	16	20	18	16
No. Weeds	9	3	7	5	6	6
% Weeds	36	14	44	25	33	37

Garden Island: *Conium maculatum* (Hemlock), *Cotula bipinnata* (Fern Cotula) and *Digitaria sanguinalis* (Crab Grass) and will probably remain in the base area.

B) DISTRIBUTION, ABUNDANCE AND THREAT OF WEEDS RECORDED

1) Weeds on Garden Island and communities on the adjacent mainland.

There is little information available on the distribution, abundance or threat potential (ability of the species to both invade and multiply in native plant communities) of most of the weeds recorded for Garden Island. Most weed lists simply record the presence of a species, rather than detailing their spread, abundance or threat potential. Except for a few major weeds this is the case for Garden Island. To help estimate the potential of weed species in these communities a series of monitoring quadrats were established on the island and in similar communities at Woodmans Point on the mainland.

Species diversity of unburnt woodlands and shrublands (data from Gibson *et al.*, 1994) ranges from 16 –25 species per 100m² (Table 1). The percentage of weeds in these sites ranges between 14 and 37%. These weeds are nearly all small annuals, except for the tuberous herb *Trachyandra divaricata*. Normally in such areas there are moss covered or bare areas free of shrubs or herbs. These micro-sites are the location of many of the unusual herbs found on Garden Island (eg: *Myostis australis*, *Cynoglossum australe* and *Lepidium puberulum*) and not on the adjacent mainland. These bare areas also lower fuel loads in these

Table 2. Weeds and Fire – Woodman's Point, 1992.

Key

a, b, c, d,e 100m² quadrats

a Foredune in recreation area

b Swale in recreation area

c,d,e Woodman's Point Conservation Area

R Regeneration mode after fire: S=from seed; R= from rootstocks, bulbs or rhizomes.

Gl Weed recorded from Garden Island.

D Dead

	a	b	c	d	e	R	Gl
Callitris preissii	*	*	*	*	*	S	
Acacia cyclops	*	*		*	*	R	
Acacia cochlearis		*	*		*	S	
Solanum symonii		*	*			S	
Melaleuca acerosa		*		*	*	R	
Melaleuca huegelii		*				S	
*Leptospermum laevigatum	*	*				S	
*Nicotiana glauca	*				*	S	*
Spyridium globulosum	*	*	*	*	*	S	
Hardenbergia comptoniana	*					R	
Scaevola crassifolia	*	*	*	*	*	R	
Anthocercis littorea	*	*	*	*	*	S	
Olearia axillaris	*					S	
Leucopogon parviflorus	*					R	
Acanthocarpus preissii	*					R	
Clematis microphylla	*					R	
Hardenbergia comptoniana	*	*		*		R	
Rhagodia baccata	*			*	*	R	
Comesperma integerrimum	*				*	R	
Schoenus grandiflora			*	*		S	
*Trachyandra divaricata	*	*	*	*	*	R	*
Threlkeldia diffusa		*				R	
*Myrsiphyllum asparagoides	*	D	D	D		R	*
*Pelargonium capitatum	*			*		R/S	
*Anagallis arvensis			*	*		S	*
*Avena barbata		*				S	*
Carpobrotus virescens		*	*		*	S	
*Carpobrotus edulis		*				S	
*Arenaria serpyllifolia				*		S	
*Brassica tournefortii					*	S	*
*Conyza albida	*					S	*
*Dishisma arenaria			*			S	*
*Erhrata longiflora		*	*	*	*	S	*
*Galium murale				*		S	*
*Galium aparine				*		S	
*Lactuca serriola	*					S	
*Bromus diandrus	*		*			S	*

Table 2 (cont.)

	a	b	c	d	e	R	GI
*Lagurus ovatus	*	*	*	*		S	*
*Lolium rigidum		*				S	*
*Sonchus oleraceus	*		*		*	S	*
*Solanum nigrum				*		S	*
*Euphorbia terracina			*			S	
Crassula colorata				*	*	S	
*Crassula glomerata	*		*	*	*	S	*
*Dittrichia graveolens	*		*			S	*
*Phytolacca octandra		*				S	*
*?Corrigola littoralis				*	*	S	
Totals	23	20	21	21	19		
No. Weeds	10	11	11	11	8		
% Weeds	43	55	52	52	42		

fire intolerant com-munities. They are unfortunately the areas first colonised by weeds, especially after fire.

As a comparison, at Woodmans Point most of the *Callitris* Forest was burnt in summer 1990. A series of quadrats were established in this area in early 1992 (Table 2). Here the species diversity ranged from 19–23 species per 100m². However, the percentage of weeds ranged from 42–55%! Of particular concern was the appearance of two perennial shrub weeds, *Leptospermum laevigatum* (Victorian Tea Tree) and *Nicotiana glauca* (Tree Tobaco) as weeds in these sites. Grassy weeds invaded the open moss areas which were killed by the fire.

Currently we can observe that on the mainland weed invasion occurs markedly after fire in these communities. Some of these weeds are long lived shrubs that could permanently alter these communities. Many shrubs and trees will be planted as ammenity species in the developed areas of Garden Island and require considerable care in selection as is currently practised by the Navy.

2) Weeds on Garden Island

In Appendix 1 all recorded weeds of Garden Island are listed with notes on the major area of occurrence on the island and the species threat potential (this is based on information in Dixon and Keighery, 1995). In summary:

- the most serious weed of Garden Island is Arum lily
- another potentially serious weed is Bridal Creeper
- there are

  30 widespread weeds (*Homeria* and *Trachyandra* could be serious)

  9 beach weeds

  6 weeds of rocky headlands

(including *Lycium* and *Lavatera*)

10 Settlement weeds

27 weeds with no data

11 "Extinct" weeds

6 weeds just persisting

4 very localized weeds (*Agonis* needs to be removed)

(a) serious or potentially serious weeds–This information shows that there are five serious or potentially serious weeds present on the Island that require management attention. These are *Zantdeschia aethiopica* (Arum Lily), *Asparagus asparagoides* (Bridal Creeper), *Trachyandra divaricata* (Strap Lily) and *Homeria flaccida* (Cape Tulip).

Other potentially serious weeds of coastal woodlands in the Perth area and present on Garden Island are, *Brassica tournefortii* (Prickly Turnip), *Euphorbia peplus* (Petty Spurge), *Urtica urens* (Stinging Nettle) and the grasses *Avena barbata* (Wild Oats), *Bromus diandrus* (Great Brome) and *Ehrharta longiflora* (Annual Veld Grass). These seem to be present at low levels on the island, but require monitoring. The above weeds have replaced the native *Parietraria debilis* as an winter understory (and the moss swards and rarer spring annuals) in many island and coastal sites in Western Australia. Perhaps Tammar grazing is holding these weeds in check on Garden Island and the Navy's careful management of these native grazers is worthy of considerable praise as they are probably the key to successful management of palatable weeds on the island.

The potential for a weed to become serious can be illustrated by *Agonis flexuosa* (Peppermint). It is recommended that the *Agonis flexuosa* plants be removed as soon as practicable, as these are seeding, and already are major weeds in Kings Park and Yanchep. They will spread rapidly after fire into the woodlands. Continual vigilance is required to prevent the development of more serious weeds.

Both *Homeria* (Cape Tulip) and *Trachyandra* are unpalatable and could spread after disturbance, such as fire. Bridal Creeper is controlled by Tammar grazing. This could also explain the low numbers of the other listed annual weeds. *Lycium* (Boxthorn) and *Lavatera* (Tree Mallow) are serious weeds of rocky islets near Perth, and probably would only be of concern on headlands on Garden Island. The potato creeper (*Anredera cordifolia*) is a serious weed in Eastern Australian rainforest and along disturbed creeklines and swamps around Perth. It could be considered a low threat, but given that Arum Lily has similar preferences, it should be removed.

CONCLUSION

Garden Island was the site for the first settlement on the west coast of Western Australia in 1829. Since that time there have been continual introductions of alien plants onto the island. Garden Island, however, unlike Rottnest was not extensively cleared or altered by changing fire regimes and today contains a series of fire

intolerant plant communities. These are the *Melaleuca* and *Callitris* woodlands, and the *Acacia* shrublands. These simple communities are also very prone to weed invasion, especially species not palatable to Tammars. The current efforts to control such weeds are commended as is the quarantine of new weeds being introduced around the base. Efforts need to be directed to removing other invasive unpalatable weeds, such as *Homeria flaccida* present on the island.

REFERENCES

BAIRD, A.M. 1958. Notes on the Regeneration of Vegetation of Garden Island after the 1956 Fire. *Journal of the Royal Society of Western Australia* 41:102–107.

BROOKER, M.G., SMITH, G.T., SAUNDERS, D.A., INGRAM, J.A., LEONE, J. and C.P.S. DE REBIERA. 1995 A Biological Survey of Garden Island, Western Australia:1. Birds and Reptiles. *Western Australian Naturalist* 20: 169–184.

BROOKER, M.G., SMITH, G.T., LEONE, J and J.A. INGRAM 1995. A Biological Survey of Garden Island, Western Australia:2. Terrestial Mammals. *Western Australian Naturalist* 20: 211–220.

DEPARTMENT OF DEFENCE 1980. Land Management Plan, Garden Island, Western Australia. Canberra.

DIXON, I.R. and KEIGHERY, G.J. 1995. Suggested methods to Control Weeds. *In Managing Perth's Bushland*, Eds: Scheltma, M. and Harris, J. Greening Western Australia, Perth, pp. 43–144.

ELLIOT, W.R. and JONES, D.L. 1990 *Encyclopedia of Australian Plants Suitable for Cultivation.* Volume 5. Lothian Publishing, Melbourne.

GARDEN ISLAND ENVIRONMENTAL ADVISORY COMMITTEE, 1996. Garden Island Environmental Advisory Committee Report of Activities 1995–1996. Department of Defence, Canberra.

GARDEN ISLAND ENVIRONMENTAL ADVISORY COMMITTEE, 1997. Garden Island Environmental Advisory Committee Report of Activities 1996–1997. Department of Defence, Canberra.

GIBSON, N., KEIGHERY, B.J., KEIGHERY, G.J., BURBIDGE, A.H. and LYONS, M.N. 1994 A Floristic Survey of the southern Swan Coastal Plain. Unpublished Report for the Australian Heritage Commission. 228 pp.

HEYLIGERS, P.C. 1989. Sea Spurge (*Euphorbia Paralias*), A Strandline Pioneer New To The Perth Region. *Western Australian Naturalist* 18: 1–6.

KEIGHERY, G.J. (1986) Garden Escapes on Rottnest Island; an Annotated Checklist. Landnote 3/86. Conservation and Land Management, Como.

KEIGHERY, G.J. and DODD, J. 1997. Occurrence and spread of Sea Spurge (*Euphorbia paralias*) along the west coast of Western Australia. *Nuytsia* 11: 285–286.

KEIGHERY, G.J. and KEIGHERY, B.J. 1992. Plant Communities of the Northern Swan Coastal Plain – with Special Reference to Uncommon and Potentially Rare Plant Communities. In *Proceedings of the Bushland in Our Backyard Workshop*, Eds: N. Gibson and B.Keighery, Wildflower Society of Western Australia, pp. 4–14.

KEIGHERY, B.J., GIBSON, N. and KEIGHERY, G.J. 1997. The regional significance of the flora and vegetation of Garden Island. Proceedings of the Royal Australian Navy, Energy and Environment Conference, 14/15 April 1997.

MARCHANT, N.G.and ABBOTT, I. 1981. Historical and recent observations on the Flora of Garden Island, Western Australia. *Western Australian Herbarium Research Notes* 5: 49–62.

MCARTHUR, W.M. 1957. Plant Ecology of the coastal islands near Fremantle, Western Australia. *Journal of the Royal Society of Western Australia.* 40: 46–64.

MCARTHUR, W.M. 1990 The Vegetation Communities and some Aspects of Landscape Management on Garden Island, Western Australia, Department of Defence. Canberra.

MCARTHUR, W.M. and BARTLE, G. A. 1981. The Landform, Soils and Vegetation as a Basis for Management Studies on Garden Island, Western Australia. C.S.I.R.O. Land Resource Management Series No. 7.

SCOTT, J.K. and WYKES, B.J. eds. 1997. Proceedings of a Workshop on Arum Lily (*Zantdeschia aethiopica*). HMAS Stirling, Garden Island, August–1997. CRC for Weed Management Systems, Adelaide.

APPENDIX 1: ANNOTATED LIST OF GARDEN ISLAND NATURALISED PLANTS

Key

{} Garden plants, listed in Marchant and Abbott (1981) but not apparently naturalised.

\+ Naturalised plants not recorded previously from Garden Island.

\# Naturalised plants only found around the northern bore and unlikely to spread further, apparently died out before re-survey in 1993.

McA McArthur, 1957, 1990, or McArthur and Bartle,1981

M/A Marchant and Abbott, 1981

AGAVACEAE

Agave americana (Century Plant). Status unknown (in 1980 Management Plan), not recorded in McA or M/A. A very slowly spreading rhizomatous perennial, removed from Rottnest.

AIZOACEAE

+Mesembryanthemum crystallinum (Ice Plant). Common on Point Atwick headland only, may spread to base areas.

Tetragonia decumbens. Recorded by McA, M/A, common, widespread, but confined to beaches.

ALLIACEAE

Allium ampeloprasum (Wild Leek), recorded in M/A, this garden escape is found scattered on tracks around the Stirling Base. Seeds prolifically but few seedlings establish.

AMARYLLIDACEAE

Leucojeum aestivum (Snowflake), recorded in McA (1990), a garden escape that does not seed, spreading slowly by bulb divisions at Beacon Head.

Narcissus tazetta (Jonquil), listed in McA as *N.jonquilla*, a garden escape, a few plants present at Beacon Head. Again this species is seed sterile, and poses little threat.

ANACARDIACEAE

Schinus terrebinthifolius (Brazilian Pepper), this species is listed in the 1980 Management Plan, but is not mentioned in M/A, but is recorded in McA (1990), a few persisting individuals found around old settlement at Beacon Head. These should be removed as they are serious weeds of bushland around Perth (Dixon and Keighery, 1995) and the fruits are spread by birds..

ARACEAE

Zantdeschia aethiopica (Arum Lily), recorded in McA and M/A. This common serious weed has been the subject of several reports and papers (see Scott and Wykes, 1997) and a major control program.

ARAUCARIACEAE

{***Auricaria heterophylla*** (Norfolk Island Pine)}

APIACEAE

+Conium maculatum (Hemlock), this is an uncommon weed found on roadverges in the Naval Base. It prefers highly disturbed sites and would probably not invade the bushland, but it is highly toxic.

APOCYNACEAE

{***Nerium oleander*** (Oleander)}, this garden plant is again highly toxic and is being removed from Rottnest Island. There are a few persisting plants between Dance Head and Beacon Head. Although a prolific seeder very few plants growing from seed have been recorded on Rottnest Island (Keighery, 1986) probably not a threat.

Vinca major (Vinca), recorded in McA (1990) there are a few persisting plants

slowly spreading via rhizomes, at Beacon Head, not a threat.

ARALIACEAE
Hedra helix (Ivy), recorded in McA, status unknown.

ASCELPIDACEAE
Gomphocarpus fruticosus (Swan Plant), recorded in McA, status unknown. A few plants seen at Beacon Head. Restricted to wetlands and very disturbed sites on Rottnest Island, and not a threat. (This is probably the species referred to as *Asceipias curassavica* (Red Head Cotton Flower) in McA, 1990, although feral populations of this species are present at Rockingham and it was a common garden plant, so it may have been present as well on the island).

ASPARAGACEAE
Asparagus (Myrsiphyllum) aspargoidcs (Bridal Creeper), recorded in McA and M/A, common potentially serious weed.

ASPHODELACEAE
Asphodelus fistulosus (Onion Weed), recorded in McA and M/A, a common weed of tracks and disturbed areas.
Trachyandra divaricata (Strap Lily), recorded in McA and M/A, a common weed of disturbed woodlands, verges, dunes and firebreaks.

ASTERACEAE
Arctotheca calendula (Cape Weed), recorded in McA and M/A, this is a scattered weed of roadverges, foredunes, picnic sites and headlands.
A. populifolia, recorded in McA and M/A, common on sandy beaches.
+A. calendula x populifolia , a rare hybrid, only 1 plant recorded, on beaches only.
Carduus pycnocephalus (Slender Thistle), recorded in M/A, still relatively common around the northern half of the Island in disturbed areas and regenerating valleys.
+Cirsium vulgare (Spear Thistle), recorded in M/A, a few persisting individuals found around old settlement at Beacon Head.
+Conyza albida (Tall Fleabane), recorded around Stirling Base and picnic areas at Herring Bay.
Conyza bonariensis (Flax Leafed Fleabane), recorded in McA, around Stirling Base and picnic areas at Herring Bay.
+Conyza parva , abundant on recent beach dunes at Broun Bay.
+Cotula bipinnata (Fern Cotula), recorded on roadverges around the Stirling Base.
Delairea odorata (Cape Ivy, previously *Senecio mikanioides)*, recorded in McA (1990), persisting around Beacon Head. This species was given as likely to spread in McA (1990) but it has not done so, outside of wetlands on the coastal plain.
Dittrichia graveolens (Stinkwort). recorded in McA, a plant of very disturbed sites, found only on road verges. Has invaded the edges of salt lakes on Rottnest, but although unpalatable, it is unlikely to be a major weed on Garden Island as it is normally only found in highly disturbed sites such as road verges.
Hypochaeris glabra (Flatweed), recorded in McA and M/A, currently found only in picnic sites and around the Stirling Base, although a very common weed of bushland in the Perth area.
Osteospermum clandestinum (Stinking Roger), recorded in McA, but not re-found in this study.
+ Pseudognaphalium luteo-album (Jersey Cudweed), recorded on roadverges around the Stirling Base.
+ Senecio vulgaris (Common Fireweed), recorded on roadverges around the Stirling Base.
Sonchus asper (Prickly Sowthistle), recorded in McA, found only in old clearings at Beacon Head, eaten by

Tammars.
Sonchus oleraceus (Sowthistle), rccorded in McA and M/A, a widespread weed scattered throughout island, probably controlled by Tammars.

BASELLACEAE
Anredera cordifolia (Madeira Vine), recorded in 1980 Managemcnt Plan and McA (1990), around the old Stirling Base and at Beacon Head. This vine produces tuberous bulbils in the axils of the leaves and could spread.

BRASSICACEAE
+*Brassica tournefortii* (Prickly Turnip), recorded on dunes at Broun Bay, by the Stirling Base.
Cakile maritima (Sea Rocket), recorded by M/A, common around the island, but is restricted to beaches only.
Hymenobolus procumbens (Oval Purse), recorded in M/A, confincd to rocky headlands, a very minor weed.
#*Nasturtium officinale* (Water Cress), extinct
Sisymbrium orientale, recorded in M/A, but not relocated, status unknown.

CARYOPHYLLACEAE
Cerastium glomeratum (Chickwecd), recorded in M/A, a scattered, but widespread minor weed in woodlands.
+*Minuartia mediterranea* (Sand Wort), recorded on dunes at Broun Bay, and on roadverges in the Stirling Base. Inconspicuous and perhaps more widespread.
Petrohagia velutina (Velvet Pink), recorded in M/A, a weed of rocky areas.
Polycarpon tetraphyllum (Allsecd), recorded in M/A, headlands, valleys.
Sagina apetala (Common Pearlwort), recorded in M/A, headlands, dunes.
Silcne gallica (French Catchfly), recorded in M/A, headlands, tracks, valleys.
+*Silene nocturna* (Mediterranean Catchfly), only recorded in Melaleuca Woodland at Second Head.
Stellaria media (Chickweed), recorded in M/A, widespread in deep valleys under Acacia.

CHENOPODIACEAE
Chenopodium murale (Nettle-leaved Goosefoot), recorded in McA, undcr Melaleuca Woodland at Second Head.

COLCHICACEAE
+*Ornithogalium arabicum* (Arabs Eye), A garden escape only recorded from a single site in valleys west of Stirling Base.

CONVOLVULACEAE
#*Ipomaea indica* (Blue Morning Glory), recorded in McA and M/A as *Convolvulus* sp. Persisting around old sttlement at Beacon Head.

CRASSULACEAE
Crassula glomerata, recorded in M/A, scattered throughout island, especially common on fore dunes.

CUSCUTACEAE
Cuscuta epithymum (Dodder), recorded in McA(1990), common around picnic sites and at Broun Bay.

EUPHORBIACEAE
+*Euphorbia dendroides* (Tree Spurge), an uncommon wced of edges of tracks at Beacon Head.
+*Euphorbia paralias* (Sea Spurge), beaches only.
Euphorbia peplus (Petty Spurge), recorded in M/A, widespread common on headlands, in valleys, Acacia shrubland and beside tracks. Serious weed of coastal Acacia shrublands around Perth.
Riccinus communis (Castor Oil Plant), recorded in McA, M/A, disturbed areas around Beacon Head and the Stirling Base.

FUMARIACEAE
Fumaria muralis (Wall Fumitory), recorded in M/A, at Beacon Head, status unknown, but able to invade

Acacia shrublands in Bold Regional Park.

GENTIANACEAE
Centaurium erythraea (Centaury), recorded in McA, M/A, widespread but scattered records from headlands and woodlands.

GERANIACEAE
Erodium cicutarium (Crowsfoot), recorded in MeA, M/A, scattered in woodlands.
Geranium molle (Doves Foot Cranesbill), recorded in M/A, status unknown.
Pelargonium capitatum (Rose Pelargonium), recorded in McA, M/A, scattered along verges, beaches.

IRIDACEAE
Iris germanica (German Iris), recorded in McA (1990), a garden escape, disturbed areas around Beacon Head and valleys west of Stirling Base. Does not seed, spreads by rhizomes, a minor weed.
Homeria ?miniata (Two Leaved Cape Tulip), recorded in McA and M/A, status unknown. However, this is a weed of heavy soils and since ***Homeria flaccida*** (Cape Tulip) is present within Stirling Base, the record of *H. miniata* is probably this species. Currently restricted in occurrence this is a very serious weed of coastal woodland communities and is toxic and unpalatable. It should be eradicated.
Watsonia species, recorded in McA and M/A, status unknown. Any *Watsonia* species should be eradicated.

JUNCACEAE
Juncus acutus (Spiny Rush), recorded from drainage basins and ovals in Stirling Base.

MALVACEAE
Lavatera arborea (Tree Mallow), recorded in MeA, on rocky headlands, this species is a serious weed on the Safety Bay Islets.

MELIACEAE
Melia azederach (Cape Lilac), recorded in MeA, M/A, a few persisting trees from old plantings.

MORACEAE
Ficus carica (Fig), recorded in McA (1990), a few persisting trees from old plantings, a weed of wetlands so probably not able to spread on Garden Island.

MUSACEAE
****Musa sapentium*** (Banana/Plantain)

MYRTACEAE
Agonis flexuosa (Peppermint) , plants of this species recorded at Herring Bay, and between Second Head and Beacon Head, weedy and able to produce numerous seedlings. This species should be removed.
(***Eucalyptus gomphocephala*** (Tuart)), a few persisting trees remain, probably will not spread unless fire occurs, should be monitored.
Eucalyptus platypus, Recorded in MeA, status unknown.

OXALIDACEAE
Oxalis pes-caprae, (Soursob), recorded in McA and M/A, status unknown, but could be a serious weed.

PAPAVERACEAE
Argemone ochroleuca, (Prickly Poppy), recorded in McA and M/A, status unknown. A weed of very disturbed sites.

PAPILLIONACEAE
Medicago polymorpha (Burr Medic), recorded in M/A, status unknown.
Melilotis indicus (Common Meliot), recorded in M/A, headlands.
Trifolium scabrum (Rough Clover), recorded in MeA, status unknown.

PHYTOLACCACEAE
+***Phytolacca octandra*** (Ink Weed), around the old settlement at Beacon Head.

POACEAE

+*Aira caryophyllea* (Silvery Hairgrass), often confused with *A. cupiana*, ?Widespread.

Aira cupiana, recorded in M/A, common weed of woodlands.

Avena barbata (Bearded Oat), recorded in McA and M/A, scattered throughout island on headlands, Stirling Base, valleys.

#*Bambusa* sp (Bamboo), probably *Arundo donax* (Giant Reed), which is commonly referred to as Bamboo. Recorded in M/A, probably around old bores at Beacon Head.

Bromus diandrus (Great Brome), recorded in McA and M/A, scatttered along tracks, base and headlands.

Bromus rubens (Red Brome), recorded in McA and M/A, status unknown.

Catapodium rigidum (Rigid Fescue), recorded in M/A, common on headlands, rare in woodlands.

Cynodon dactylon (Couch), recorded in M/A, woodlands around Stirling Base.

+*Digitaria sanguinalis* (Crab Grass), recorded on Tracks in Stirling Base.

Ehrharta longiflora (Annual Veld Grass), recorded in M/A, scattered in woodlands.

Eragrostis curvula (African Love Grass), recorded in McA, status unknown.

Hordeum leporinum (Barley Grass), recorded in M/A, status unknown.

Hordeum vulgare (Barley), recorded in M/A, status unknown.

Lagurus ovatus (Hare's Tail Grass), recorded in McA,M/A, headlands, woodlands.

Lolium rigidum (Wimmera Rye Grass), recorded in M/A, scattered along tracks, headlands.

Parapholis incurva (Coastal Barbgrass), recorded in M/A, headlands only.

Poa annua (Winter Grass), recorded in McA, M/A, tracks, scattered in woodlands.

Polypogon monspeliensis (Annual barbgrass), recorded in McA, M/A, status unknown.

Stenotraphum secundatum (Buffalo Grass), recorded in M/A, around Stirling Base.

+*Thinopyrum distichum* (Sea Wheat), scattered plants on beaches only.

Vulpia myuros (Rats Tail Fescue), recorded in M/A, valleys, woodlands.

POLYGONACEAE

Emex australis (Doublegee), recorded in McA and M/A, only on verges, very disturbed areas.

Rumex glomeratus (Dock), recorded in McA (1990), probably *R. conglomeratus*, at Beacon Head, status unknown.

PRIMULACEAE

Anagallis arvensis (Pimpernel), recorded in McA and M/A, comon but minor weed of whole island.

+*Asterolinon linum-stellatum* (Asterolinon), Around Govenor Stirling's Well.

PUNICACEAE

{*Punica granatum* (Pomegranate)}, extinct.

ROSACEAE

{*Crataegus* sp. (Hawthorn)}, extinct.

RUBIACEAE

Galium murale (Bedstraw), recorded in M/A, widespread weed of woodlands.

{*Ixora* sp. }, recorded in McA, status unknown.

Sherardia arvensis (Field madder), recorded in M/A, scattered in valleys and woodlands.

Verbascum virgatum (Green Mullein), recorded in McA, status unknown.

SCROPHULARIACEAE

#*Cymbalaria muralis* (Ivy Leaved Toadflax), Status unknown recorded in 1980 Plan as occuring at old bore site, not in McA or M/A. This is possibly *Asarina (Maurandya barcalaiana)*, which I have recorded at Beacon Head.

Dischisma arenarium, recorded in

McA,M/A, widespread weed of woodlands, beaches and headlands.
Asarina barcalaiana, (no common name), a summer annual to short lived perennial vine, at Beacon Head.
Parentucellia latifolium (Sticky Bartsia), recorded in M/A, status unknown.

SOLANACEAE
+Lycium ferocissimum (Boxthorn), Rocky headlands only, potentially serious weed.
Nicotiana glauca (Tree Tobacco), recorded in M/A, status unknown.
Solanum nigrum (Black Nightshade), recorded in McA,M/A, scattered throughout island.

TYPHACEAE
**Typha orientalis* (Bullrush), recorded in McA and M/A.

URTICACEAE
Urtica urens (Stinging Nettle), recorded in M/A, a scattered weed of Melaleuca Woodlands near coast.

VALERIANACEAE
Centranthus ?ruber (Spur Valerian), recorded in McA, status unknown, Probably *C. macrosiphon*, which is a common weed of coastal sands and limestones in the Perth area.

VITACEAE
{*Vitis vinifera* (Grape)}, extinct.